A Yokogawa Commitment to Industry

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SUCCESS STORY

MUSI PULP MILL PROJECT

Location: Indonesia
Order Date: 1998
Completion: 2000
Industry: Pulp & Paper

Customer:RWE Solutions (formerly TESSAG)
An international corporation based in Duisburg, Germany that was able to secure a US$ 780 million contract to construct a project marketly known as “Musi Pulp Mill”. Construction started Sept. 1997 after financial agreements between the plant’s owner, PT TEL and 32 foreign banks has been sealed-off.

End-User: PT TEL
The plant, located 130 km west of the provincial capital, Palembang South Sumatra in Indonesia is one of the biggest pulp mills in SouthEast Asia in terms of production capacity. The entire mill output product, an elemental chlorine-free pulp (ECP) is destined for export, 80% to Europe and 20% to Japan. The raw material, fast-growing acacia mangium trees, is sourced from an industrial plantation.

Process Application - Pulp & Paper Process Description: The plant uses chemical to breakdown the wood chips into pulp, a process which is called “kraft”.

Acacia woods, the raw material, arrive in the mill in forms of roundwoods. The process starts when the logs are debarked, barks are burned in the Power Boiler to produce steam. After debarking the logs are chipped into fragments, about 1/4 “x 3/4”. Oversize chips are isolated and rechipped after passing through multistage vibratory screens.
Wood chips and white liquor, cooking chemicals, are fed into the top of the digester in a continuous flow and ready cooked pulp is blown out continuously from the bottom of the digester. In this process, the cellulose/ fibres, forming the pulp, is separated from lignin. A digester, in a simple term, is a pressure tank that will hold the chips, water and chemicals while they cook. Cooking time is about 2-4 hours at 160-170 DegC.

The pulp is then washed and screened to remove the contaminants, the objective is to recover the maximum amount of spent cooking chemicals with minimum dilution. Next, it is bleached to its desired brightness before being dried to a solid content of 90%. The dried pulp is cut into sheets which are piled in stacks, the sheet piles are then bale pressed, marked and carried on conveyors to the storage shed, all done automatically.

The black liquor, lignin + cooking chemicals, from the brown-stock washers, containing about 16% dry solids, is evaporated in a multieffect evaporator to about 50% dry solid and further concentrated in a direct-contact evaporator to about 65% solid content. It is then used as a fuel for the Recovery Boiler to generate steam and electric-

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ity, the cooking chemicals form a smelt in the bottom of the boiler. When the smelt is dissolved a “green liquor” is formed, contains mainly sodium compounds. Green liquor is added to a mixture and sent to the causticizing tanks and finally into the clarifier, where the white liquor is recovered and fed back into the digester.

Requirement: As the customer’s answer to the end-user’s DCS system preference, RWE Solutions contracted Yokogawa Europe(YEF) to provide a complete DCS package for Musi Pulp Project. A massive DCS project for YEF in terms of scale then started engineering in the first quarter of 1998, with the objective of delivering the whole system by the beginning of 1999 for site installation and commissioning until end-1999. First pulp was produced by Dec.1999.

Yokogawa’s recomendation: Powerful, reliable, unix-based CENTUM CS is Yokogawa’s platform to achieve the customers requirement.

Considering the project being large scale, system configuration is segregated into two domains. Plant areas related to chemical recovery and energy is included in Domain 1 while areas related to pulping and chemical preparation is included in Domain 2.

The Functional Design Specification written by the customer with Yokogawa’s guidance has been the core basis of the software configuration. Various plant manufacturers of every mill areas had provided engineering input documents like SAMA drawing, control narrative and logic diagram which was then translated by Yokogawa into DCS control drawing.

The general control philosophy was segregated into DCS and the PLC, analog control is the main DCS scope while interlockings and motor/ valve sequences is under the PLC. Modicon PLC is communicating with DCS via ModBus protocol which is supported by CENTUM CS. A watchdog bit is being transfer between the DCS and PLC to monitor the status of communication. Advance control strategy was implemented for areas like Digester and Boilers, which was carried out via a collaboration between Yokogawa and the engineering constructer’s specialist.

The project uses control drawing typicals for valves, motors and simple feedback controls, the objective of using the typicals is to attain consistency in configuration which is an important factor for big projects. They said typicals were intensively tested first with the customer before being used for the configuration. Special software configuration was done to facilitate Digester’s supervisory control interface with the DCS. A total of three months of factory acceptance test was staged by YEF for both domains which was attended by the representatives of the client and their sub-contractors.
The system was then shipped to site on the first quarter of 1999 and Yokogawa assigned engineers to supervise the DCS system startup and commissioning until end-1999. The project was completed as per the schedule.

System: **CENTUM CS**
Total I/O: **Hardwired - AI : 2,000 RS-232/RS485 - AI/AO : approx.600**
AO : 850 DI/DO : approx.25,000
System Configuration: **16 x Field Control Station, 25 x Operator Station, 2 x Engineering Work Station, 1 x Computer Gateway**